

REMARKS

The Office Action of June 1, 2009 was received and carefully reviewed. Claims 1-2 and 4-7 were pending prior to the instant amendment. By this amendment, claims 1 and 5 are amended. Claims 6-7 are canceled. Consequently, claims 1-2 and 4-5 are currently pending in the instant application. Reconsideration and withdrawal of the currently pending rejections are requested for the reasons advanced in detail below.

Claims 5, 6 and 7 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. Claim 5 has been amended to recite, *inter alia*, “a heat treatment.” In addition, claim 5 also recites:

“ . . . rapidly cooling and solidifying the melt of the alloy by a strip casting process, thereby making a rapidly solidified alloy . . . pulverizing the rapidly solidified alloy to form an alloy powder . . . ”

It is believed that the currently amended claim 5 obviates the Examiner’s concerns and overcomes the rejection. Claims 6 and 7 have been canceled.

Claims 1, 2, 4 and 5 were rejected under 35 U.S.C. §103(a) as obvious over Uchida et al. (U.S. Patent No. 6,468,365, hereinafter “Uchida”). Each of the claims recite a specific combination of features that distinguishes the invention from the prior art in different ways. For example, independent claim 1 recites a combination that includes, among other things:

“ . . . 27.0 mass% to 32.0 mass% of R, which is at least one of Nd, Pr, Dy and Tb and which always includes either Nd or Pr . . . ”

63.0 mass% to 72.5 mass% of T, which always includes Fe and up to 50% of which is replaceable with Co . . . ”

0.01 mass% to 0.08 mass% of Ga . . . ”

0.90 mass% to 0.96 mass % of B . . . ”

wherein the magnet comprises a main phase with a tetragonal R₂T₁₄B type crystal structure, which accounts for at least 90% of the overall volume of the magnet, but includes substantially no R₁Fe₄B₄ phases.”

Independent claim 5 recites yet another combination that includes, *inter alia*,

“ . . . preparing a powder that has a composition comprising 27.0 mass% to 32.0 mass% of R (which is at least one of Nd, Pr, Dy and Tb and which always includes either Nd or Pr), 63.0 mass% to 72.5 mass% of T (which always includes Fe and up to 50% of which is replaceable with Co), 0.01 mass% to 0.08 mass% of Ga and ~~0.85~~ 0.90 mass% to 0.96 mass % of B of an alloy . . .

rapidly cooling and solidifying the melt of the alloy by a strip casting process, thereby making a rapidly solidified alloy . . .

pulverizing the rapidly solidified alloy to form an alloy powder . . .

compacting and sintering the alloy powder, thereby making a sintered magnet; and subjecting the sintered magnet to a heat treatment at a temperature of 400°C to 600°C.”

At the very least, Uchida, whether taken alone or in combination, fail to disclose or suggest any of these exemplary features recited in independent claims 1 and 5.

Prior to the present invention, Applicant contends that there was no common knowledge that the range of 0.90 mass% to 0.96 mass% of boron could or should be employed, as claimed, since it was known that such a low concentration of boron would degrade the magnet properties in the claimed environment. Support for Applicant's assertion includes the knowledge that in a conventional R-T-B based sintered magnet which does NOT comprise Ga, it was readily known that as the boron concentration was lowered, a soft magnetic R_2Fe_{17} phase would be easily formed in the grain boundary phase, and therefore, the coercivity would significantly decrease.

In support thereof, the attached article A1 shows that magnetically soft $Fe_{17}Nd_2$ drastically decreases the coercivity of the material. In addition, FIG. 4 of the attached article A2 discloses that magnetic properties will drastically degrade when the boron concentration becomes less than 6 atomic % which corresponds to 0.98 mass%. $Nd_{15}B_6Fe_{79}$ (atomic % representation) corresponds to $Nd_{32.58}B_{0.98}Fe_{66.44}$ (mass% representation). Thus, the prior art

demonstrates a dramatic drop off of magnetic properties, whereas the magnetic properties of the R-T-B based sintered magnet having the recited range compositions stayed relatively constant.

Accordingly, there has been no report amongst skilled artisans that the addition of Ga can change the critical dependency of magnetic properties on the boron concentration around 0.98 mass%. Even more, Applicant asserts that Uchida simply fails to teach or suggest that the addition of the small amount of Ga will change the behavior of the conventional magnet comprising no Ga.

As a result, persons of ordinary skill in the art would otherwise fully expect that magnetic properties will degrade drastically when the boron concentration becomes less than 0.98 mass% – even for a magnet in which Ga is added. Given this knowledge of the current state of the prior art, Applicant respectfully submits that to otherwise modify Uchida in order to obtain the R-T-B based sintered magnet of the claimed invention, as purported by the Examiner, the Examiner improperly relies upon a hindsight reconstruction of Applicants' own disclosure in an attempt to address the deficiencies of the Uchida reference. This assertion is further evidenced by the Examiner's own admission that “[t]he claims and Uchida ‘365 differ in that Uchida ‘365 does not teach the exact same proportions as recited in the instant claims and Uchida ‘365 is silent with respect to the relative proportion of the $R_2T_{14}B$ and $R_{1.1}Fe_4B_4$ phases as recited in claim 1” (e.g., see page 7, second paragraph of outstanding Office Action). Accordingly, there would otherwise be no motivation (emphasis added) in Uchida to decrease the boron concentration less than 0.97 mass% as claimed.

Even further, Applicant respectfully asserts that one of ordinary skill in the art would not modify Uchida to provide for adjusting the behavior of the conventional magnet, as claimed, since doing so would change the principle operation of Uchida, thereby rendering

Uchida unsatisfactory for its intended purpose. As directed by MPEP 2143.01(V), “[i]f proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).” Moreover, as directed by MPEP 2143.01(VI), “[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).” Thus, Applicant respectfully asserts that the Examiner’s purported modification of Uchida to obtain the produced R-T-B based sintered magnet, as claimed, is not sufficient to render Applicant’s claimed invention *prima facie* obvious.

FIG.1 of the present application shows that the intrinsic coercivity H_{cJ} of the sample including 0.96 mass% boron and 0.02 mass% Ga is much more than that of the sample including 0.96 mass% boron and no Ga. The addition of a small amount of Ga can increase the intrinsic coercivity H_{cJ} of the R-T-B base sintered magnet that includes 0.96 mass% boron or less.

According to FIG.1, when the boron concentration exceeds 0.96 mass%, a difference in the intrinsic coercivity H_{cJ} between the sample including Ga and the sample including no Ga is very small. Therefore, in connection with the conventional magnet wherein the boron concentration is set more than 0.96 mass%, the advantageous effect of the addition of Ga has not been recognized prior to Applicant’s discovery.

In contrast, a difference in the intrinsic coercivity H_{cJ} between the sample including Ga and the sample including no Ga becomes large when the boron concentration is equal to or less than 0.96 mass%. In view of the effects of the addition of Ga, Applicant has

discovered a critical point existing between 0.96 mass% and 0.97 mass% in boron concentrations of the R-T-B base sintered magnet.

Accordingly, the above effects of the Ga addition into the R-T-B base sintered magnet in which the boron concentration is in the range from 0.90 mass% to 0.96 mass% is NOT rendered obvious by the cited prior art. Furthermore, the aforementioned effects are regarded as “unexpected results” of the present invention and are fully supported by the disclosure of the present application.

With respect to claim 5, the claim recites a step of subjecting the sintered magnet to a heat treatment at a temperature of 400 °C to 600°C. As described above with reference to FIG.1, the heat treatment drastically increases the intrinsic coercivity H_{ci} of the sample that includes 0.96 mass% boron and 0.02 mass% Ga. Again, these otherwise unexpected properties are not made obvious by the cited prior art.

According to the present invention, even though the boron concentration is reduced, a high-coercivity sintered magnet, including substantially no boron-rich phases ($R_{1.1}Fe_4B_4$), can still be provided with the production of a minimized soft magnetic phase.

Without the teachings of the present invention, the boron concentration would otherwise be set to be more than 0.96 mass%. Uchida simply fails to teach or suggest that the boron concentration can be less than 0.97 mass%. As has been explained, a person of ordinary skill in the art at the time the invention was made would have otherwise thought that the coercivity would decrease if the boron concentration was set less than 0.97 mass% irrespective of the presence of Ga. To conclude otherwise or to suggest a skilled artisan would have modified the concentration of boron in the presence of Ga in Uchida is improper, since there is simply no suggestion in the prior art and, hence, no motivation to do so.

The Examiner has failed to establish a *prima facie* case of obviousness for at least four reasons. First, the Examiner has not demonstrated how Uchida, whether taken alone or in combination, discloses or suggests each and every feature recited in the claims. *See* M.P.E.P. § 2143 (8th ed. 2007). Second, the Examiner has not shown the existence of any reasonable probability of success in modifying Uchida, the base reference, based on the teachings of another secondary reference, in a manner that could somehow result in the claimed invention. *See id.* Third, the Examiner has not identified any suggestion or motivation, either in the teachings of the applied references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify Uchida in a manner that could somehow result in the claimed invention. *See id.* Finally, the Examiner has not explained how his obviousness rationale could be found in the prior art — rather than being a hindsight reconstruction of Applicants' own disclosure. *See id.*

Each of the Examiner's factual conclusions must be supported by “substantial evidence” in the documentary record, as required by the Federal Circuit. *See In re Lee*, 61 U.S.P.Q.2d 1430, 1435 (Fed. Cir. 2002). The Examiner has the burden of documenting all findings of fact necessary to support a conclusion of anticipation or obviousness “less the ‘haze of so-called expertise’ acquire insulation from accountability.” *Id.* To satisfy this burden, the Examiner must specifically identify where support is found within the prior art to meet the requirements of 35 U.S.C. §§ 102(b) and 103. In this case, however, the Examiner has failed to satisfy his burden of demonstrating how Uchida, taken alone or in combination, can either anticipate or render obvious each and every one of the limitations present in independent claims 1 and 5, as required by the M.P.E.P. and Federal Circuit jurisprudence.

In accordance with the M.P.E.P. § 2143.03, to establish a *prima facie* case of obviousness of a claimed invention, all the claim limitations must be taught or suggested by

the prior art. *In re Royka*, 409 F.2d 981, 180 USPQ 580 (CCPA 1974). “All words in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 196 (CCPA 1970). Therefore, it is respectfully submitted that Uchida, taken alone or in any proper combination, fails to disclose or suggest the subject matter as recited in claims 1 and 5. Hence, withdrawal of the rejection is respectfully requested.

Each of the dependent claims ultimately depend from claim 1 and are patentable over the cited prior art for at least the same reasons as set forth above with respect to claim 1. In addition, each of the dependent claims also recites combinations that are separately patentable.

In view of the foregoing remarks, this claimed invention, as amended, is not rendered obvious in view of the prior art references cited against this application. Applicant therefore requests the entry of this response, the Examiner’s reconsideration and reexamination of the application, and the timely allowance of the pending claims.

In discussing the specification, claims, and drawings in this response, it is to be understood that Applicant in no way intends to limit the scope of the claims to any exemplary embodiments described in the specification and/or shown in the drawings. Rather, Applicant is entitled to have the claims interpreted broadly, to the maximum extent permitted by statute, regulation, and applicable case law.

Except for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§ 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account

No. 19-2380. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Should the Examiner believe that a telephone conference would expedite issuance of the application, the Examiner is respectfully invited to telephone the undersigned patent agent at (202) 585-8316.

NIXON PEABODY, LLP

/Marc W. Butler, Reg. #50,219/
Marc W. Butler
Registration No. 50,219

NIXON PEABODY LLP
CUSTOMER NO.: 22204
401 9th Street, N.W., Suite 900
Washington, DC 20004
Tel: 202-585-8000
Fax: 202-585-8080